

MT. BAKER-SNOQUALMIE NATIONAL FOREST CATEGORICAL EXCLUSION CHECKLIST

Project Name: USGS Glacier Peak GPS Topography Sensors and Core Sampling



Ranger District: Darrington

Date: June 23, 2016

Proposed Actions: (1) Install temporary topography sensors and Global Positioning Systems (GPS) antenna at two stream systems originating from Dusty and Chocolate Glaciers on Glacier Peak, to estimate mass erosion of coarse sediment from headwaters of the Suiattle River watershed. The tripod-mounted GPS antennas and other equipment would be delivered to each site by helicopter, with two slings. A four-person ground crew would hike in to install the Dusty Glacier and Chocolate Glacier sites, and hike out afterwards (16 miles each way). The antennas would be in place for up to a one week period during the summer of 2016, and then flown out by helicopter sling load. (2) Collect geophysical core samples needed for dating eruptive history of the Glacier Peak volcano. The core sample collection would require the use of a small gas powered coring drill to retrieve approximately eight cores at each of 10 sites. Core dimensions are 1 inch in diameter and three inches long. Crews would hand-carry the drill to the sites on foot and carry core samples out. The data collection would occur over a three-year period, during the summers of 2016-2018.

Purpose & Need: There is need for data collection that provides the basis for natural resource decisions, and for the provision of localized information which can detect changes in ecological systems. There is also a need to respond to USGS requests for special use permits as per Forest Plan direction for land uses.

Applicable CE Category: 7 CFR 1b.3 (a) (3): *Inventories, research activities, and studies, such as resource inventories and routine data collection when such activities are clearly limited in context and intensity*

Resource Conditions (from 36 CFR 220.6 (b))		Specialist Signature (or Initials) and Date	Comments & Explanation
Public scoping (including Tribes)		Phyllis Reed - District Environmental Coordinator, 6/13/16	March 17, 2016 - tribal letters March 18, 2016 - public scoping letter
i. Threatened or Endangered species or their Critical Habitat, or Sensitive species. (PCEF signed)	Wildlife	Phyllis Reed - District Wildlife Biologist, 6/15/16 email	No Effect to the federally listed species and critical habitat of spotted owl, marbled murrelet, grizzly bear and gray wolf. No effect, limited noise, and no habitat impacts to FS MIS and Sensitive species. Refer to wildlife review (June 2016)
	Fisheries	Jeremy Gilman - Fisheries biologist 06/23/2016 	Project distance and limited ground disturbance both in duration and intensity will have no effect on ESA listed fish, designated critical habitat, or EFH per MSA. There will be no adverse effect on the viability of MIS fish populations on the MBS nor their habitat.
	Plants	Shauna Hee - Botanist, 6/15/16 email	No concerns for Sensitive, Survey and Manage, or invasive plants.
ii. Flood plains, wetlands, or municipal watersheds		Chris Stewart - Hydrologist, 6/20/16 <i>/s/Chris Stewart</i>	This project would not effect flood plains, wetlands, or municipal watersheds.
iii. Congessionally designated area (such as wilderness, wild and scenic rivers, etc.)		Gary Paull - Forest wilderness specialist, 6/17/16 email	Glacier Peak Wilderness - Minimum Requirement Analysis (June, 2016) attached
iv. Inventoried Roadless areas (or wild and scenic study rivers, etc.)		Phyllis Reed - District Environmental Coordinator, 6/13/16	Activity is outside of Inventoried roadless or study rivers.
v. Research Natural Areas (or Nation. Natural Landmarks, Special Interest Areas, etc., existing or proposed)		Phyllis Reed - District Environmental Coordinator, 6/13/16	Activity is outside of any Research Natural Area,exisiitng or proposed
vi. American Indian religious or cultural sites or traditional use areas		Paul Alford - Forest Heritage Specialist 6/23/2016 	March 17, 2016 scoping letter, no Tribal responses received.

vii. Archaeological sites, or historic properties or areas

Paul Alford – Forest Heritage Specialist 6/23/2016

No potential to effect historic properties

The above specialists have reviewed the proposed action and the categorical exclusion section of the Forest Service NEPA Regulations 36 CFR 220. None of the resource conditions listed in 36 CFR 220.6 (b) (i) through (vii) indicate that extraordinary circumstances exist that warrant analysis and documentation in an EA or EIS.

Prepared by: /s/ Eric Ozog

ID Team Leader Signature

6/24/16

Date

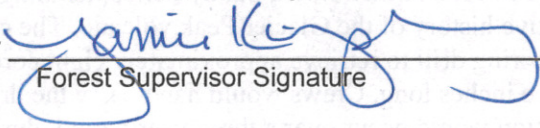
Reviewed by: /s/ Lorena Wisehart

NEPA Coordinator Signature

6/29/16

Date

Approved by:


Forest Supervisor Signature

6/30/16

Date

GLACIER PEAK WILDERNESS

Minimum Requirement Analysis – Use of Motorized Equipment

Glacier Peak Geology and Sediment Transport Study



USDA Forest Service
Mt. Baker-Snoqualmie National Forest
Darrington Ranger District

June 2016

BACKGROUND

Sediment Transport:

The retreat of glaciers around the Pacific Northwest has exposed large quantities of unconsolidated sediment resting on the flanks of volcanos of the Cascade Range. That sediment is readily mobilized downstream in periodic debris flows, after which the material becomes incorporated into the sediment load of downstream river systems. Rivers commonly respond to significant increases in sediment input rates, and particularly coarse sediment inputs, with downstream adjustments in bed elevation and

channel character. There is a concern that the changing sediment availability associated with glacial retreat may lead to increased flood hazards and lateral channel mobility in downstream river systems, impacting adjacent communities and potentially altering ecologic conditions. United States Geological Survey (USGS) studies have been undertaken, or are underway, to assess these dynamics downstream of Mount Rainier and Mount Baker, but to date, the remote nature of Glacier Peak has limited the collection of applicable data.

Direct measurement of coarse sediment loads in the steep, dynamic pro-glacial streams emanating from Glacier Peak is impractical. Instead, our goal is to use repeat high-resolution topographic surveys to measure the accumulated change in the landscape over annual time scales. These surveys, and the change between them, then provides an estimate of the mass of sediment eroded from the upper watershed, the processes and spatial patterns involved with that erosion, and a view of how the upper river systems have responded those inputs. The baseline for change detection comes from an aerial LIDAR survey completed in 2014. Subsequent surveys acquired as part of this project would be based on a novel photogrammetric survey method known as Structure-from-Motion (SfM) photogrammetry. SfM provides a low-cost, flexible, and highly accurate means of surveying landscapes with minimal vegetation, requiring only a set of overlapping photographs and a set of visually identifiable ground control points with known coordinates.

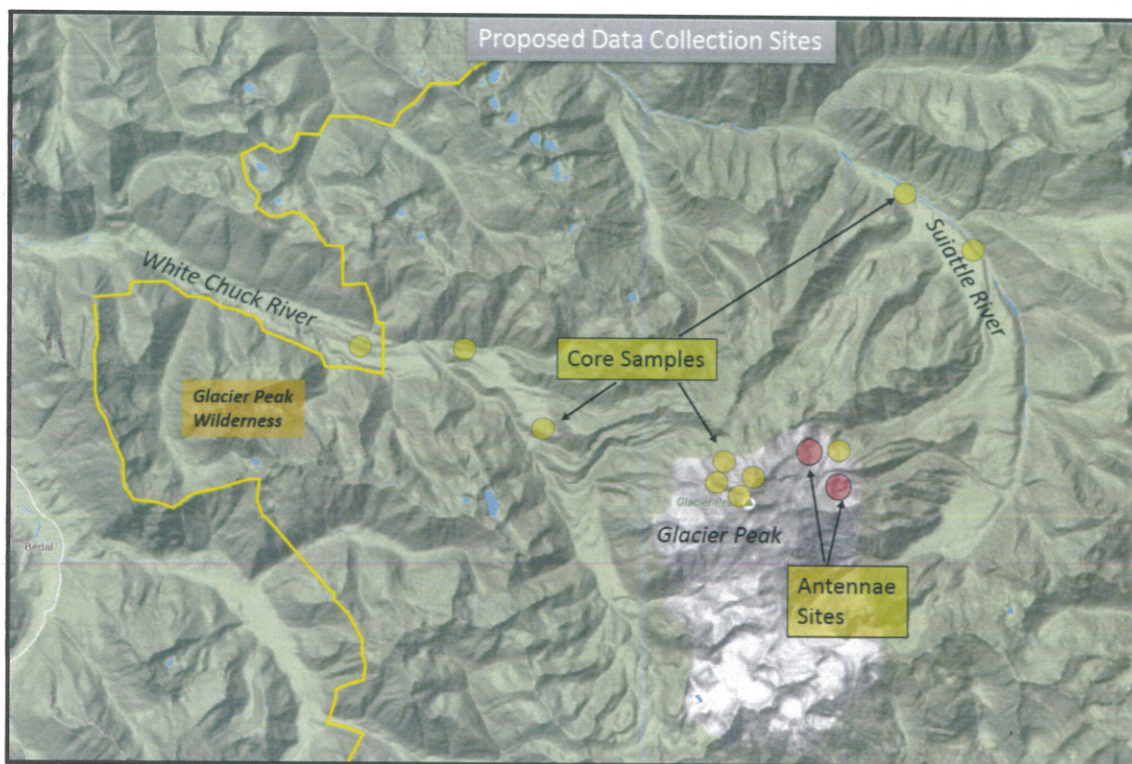
The collection of repeat topographic surveys would provide a measure of the coarse sediment loading from the flanks of Glacier Peak and, by observing how and when that sediment is introduced, improve our ability to forecast how continued glacier retreat or alterations to the regional hydroclimatology will impact continued sediment loading. This work builds upon five years of fine sediment monitoring in the Sauk-Suiattle River systems and complements concurrent on-going studies assessing sediment loads from non-glacial tributaries in the basin and the impacts of channel bed scour and mobility on salmonid populations. In concert, these efforts will provide an integrated look at both coarse and fine sediment dynamics within the Sauk-Suiattle system from both glacial and non-glacial sources and their impacts on local human and ecological communities.

Geology:

Understanding the eruptive history of Glacier Peak volcano is important to help determine the extent and type of threats to human life and infrastructure within and outside the Glacier Peak Wilderness. Recent mapping has found that the history of the volcano is more complex than previously thought and important date markers for different phases of eruption are not currently available. This is due to traditional gaps between different types of dating methods. A newer paleomagnetic dating method which is applicable to relatively young rocks, like those around Glacier Peak, can accurately date the formation of volcanic rocks erupted between several hundred and tens of thousands of years. The method involves collecting groups of small core samples, roughly 2.5 cm in diameter and length of about 10 cm. Samples are obtained by a small, gasoline-powered portable drilling apparatus with a water-cooled diamond bit. For the best accuracy, each site requires obtaining eight cores. Nine

wilderness sites are proposed for drilling. One additional site is located west of the wilderness boundary.

Depending on the hardness of the rock, and condition of the diamond boring bit, each hole takes 1 to 5 minutes to drill. A thin orientation sleeve which measures the angle of the sample and its magnetic orientation is placed around the core prior to breaking it free. A line is scratched across the top of the core with a brass wire to record its *in situ* orientation. The sample is then taken to the lab where detailed studies of the cores are compared to the geomagnetic record so the rock can be dated. The bore holes are backfilled with native soil and rock flour.



Site Access

Access to the area will be from either the Suiattle Trailhead for the antennae sites and Suiattle drill sites. White Chuck and Summit area drill sites will most likely be accessed from the White Chuck. Summit sites may be accessed from the North Fork Sauk Trail. From the Suiattle Trailhead at the end of the Suiattle Road, FR 26, the Suiattle Trail (#784) is taken about 7 miles to the junction with the Pacific Crest National Scenic Trail (#2000). The PCT is followed for about 4 miles south to Vista Creek from which point the un-maintained Upper Suiattle Trail (#798) is followed for about 2 miles to a crossing of Dusty Creek. From the east side of Dusty Creek, the route follows the un-maintained Dusty Ridge Trail up to treeline and open slopes leading to the terminus area of the Dusty Glacier. Due to lack of

maintenance the route from Vista Creek on is essentially cross cover travel, much of the way through heavy timber. Weather and terrain will determine if access is possible over the ridge south of the Dusty Glacier to the Chocolate Glacier, or if the crew will back out to the main trail below tree line, heading south, to regain Chocolate Creek and the Chocolate Glacier. Both options involve the gain and loss of over 2000 feet.

The White Chuck areas are accessed via the decommissioned White Chuck Road to the washed out White Chuck Trail. Access is difficult with numerous down logs, brush, and washed out slopes.

OPTIONS CONSIDERED OUTSIDE OF WILDERNESS

Glacier Peak is one of the major stratovolcanoes of the Pacific Northwest and is located entirely within the Glacier Peak Wilderness. This study is part of larger studies which are intended to increase awareness of the threats posed by this volcano within and beyond the wilderness. While research of past lahar, ashfall, and other aspects of past eruptions have taken place outside the wilderness, some of the most critical information needs to be gathered directly on the volcano itself.

SPECIAL PROVISIONS, VALID EXISTING RIGHTS

Glacier Peak Wilderness was established in 1964 as one of the 54 original wilderness areas. The wilderness was expanded in 1968 as part of the North Cascades National Park creation and further expanded by the 1984 Washington State Wilderness Act. There are no Special Provisions in the legislation related to study of the volcano in any of the previous legislation.

REQUIREMENTS OF OTHER LEGISLATION

The Disaster Relief Act (P.L. 93-288, known as the Stafford Act) designates the USGS as the lead Federal agency with responsibility to provide notification for earthquakes, volcanic eruptions, and landslides to enhance public safety and to reduce losses through effective forecasts and warnings based on scientific information. Information gathered by this project will assist the USGS in making determinations regarding local and regional threats to life and infrastructure related to the volcano.

Under 36 CFR Part 293.6(c), "The Chief, Forest Service, may authorize occupancy and use of National Forest land by officers, employees, agencies, or agents of the Federal, State, and county governments to carry out the purposes of the Wilderness Act and will prescribe conditions under which motorized equipment, mechanical transport, aircraft, aircraft landing strips, heliports, heliports, installations, or structures may be used, transported, or installed by the Forest Service and its agents and by other Federal, State, or county agencies or their agents, to meet the minimum requirements for authorized

activities to protect and administer the Wilderness and its resources. The Chief may also prescribe the conditions under which such equipment, transport, aircraft, installations, or structures may be used in emergencies involving the health and safety of persons, damage to property, or other purposes". See FSM2324.34 – Other Agency Structures.

MINIMUM REQUIREMENT DETERMINATION

The purpose of this project is to better understand the geology and sediment transport of the Glacier Peak Volcano. The project will also lead to a better understand of how to protect wilderness visitors and communities that are downstream of the mountain. Major flooding events occurring downstream from the glaciers in the upper Suiattle and white Chuck drainage have damaged or destroyed infrastructure including trails, bridges and campsites in the wilderness. Understanding the dynamics of this environment will help the Forest Service administer the Glacier Peak Wilderness including how and where to locate trails and camps.

The minimum requirement of the project is to place GPS antennas below Chocolate and Dusty Glaciers and obtain referenced core samples from various locations on the mountain.

ALTERNATIVES CONSIDERED

Three alternatives were considered to meet the minimum requirements of the project:

- Alternative 1: Using Motorized Equipment for Equipment Transport and Drilling
- Alternative 2: Using Non-Motorized Equipment Transport and Drilling
- Alternative 3: Using Motorized Equipment for Personnel Transport and Drilling

A No Action Alternative would not meet the minimum requirement for the project. To address the hazards posed by Glacier Peak, the United States Geological Survey, as part of its mandate to mitigate volcanic hazards, is compelled to address the hazards posed by Glacier Peak.

An Alternative that would take place outside of wilderness is not feasible as Glacier Peak is located entirely within the wilderness area.

Policy

Forest Service Manual 2300 – cites conditions under which the use of motorized and/or mechanized equipment use may be approved. Section (5) of 2326.1 specifies the type of conditions that would meet minimum needs for protection and administration of the area as wilderness. These include:

- a) A delivery or application problem necessary to meet wilderness objectives cannot be resolved within reason through the use of non-motorized methods.
- b) An essential activity is impossible to accomplish by non-motorized means because of such factors as time or season limitations, safety, or other material restrictions.
- c) A necessary and continuing program was established around the use of motorized equipment before the unit became a part of the National Wilderness Preservation System, and the continued use of motorized equipment is essential to continuation of the program.

Alternatives 2 and 3 do not rely on the use of motorized equipment and are not affected by this policy. Alternative 1 may, meet the test of (a) and (b) in this policy.

Alternative 1) Using Motorized Equipment for Equipment Transport and Drilling

This alternative would allow for a helicopter to deliver two Real Time Kinematic-Global Navigation Satellite System (RTK-GNSS) antennas, batteries and other electronic gear to the Dusty and Chocolate Glacier sites. Approximate weight of equipment for each site is about 300 lbs. To minimize flight time over the wilderness, the helicopter would be staged out of the Green Mountain Pasture. The helicopter would be fitted with 2 sling loads of equipment that could be placed at sites below the two glaciers. The ground crew would hike to the sites to set up the equipment and one crew member would need to be at the Dusty Creek site to unhook the first sling load from the helicopter. The second load would be remotely released and no one would be needed on the ground. After set-up at the two locations, the equipment would be put back into the slings and retrieved at the end of the study period by helicopter.

The helicopter would require about 40 minutes of flight time over the wilderness for placing and retrieving the two sling loads.

The coring portion of the project would require the packing in of small coring drill. Its weight is about 15 lbs. A small amount of fuel would also be needed to run the drill for about ½ hour at each of the nine sites. Water for the drill would be obtained on-site from nearby streams, melting snow, or carried from a more distant location. Drill cores weigh about 0.5 ounces each or 3 lbs. for each site. The core samples would be backpacked out of the wilderness. Because of the dispersed nature of these sites, it is likely that the project would be accomplished in three phases likely spanning three calendar years. Phase 1 would be the Suiattle sites, Phase 2 those in the White Chuck and Phase 3 would be the sites near the summit of Glacier Peak.

Summary Table of Estimated Helicopter Use¹

Location	# of trips	Helicopter Time (min)	Helicopter type ²	Cargo
Dusty/Chocolate Creeks	1	20	3	Survey Equipment Fly In
Dusty/Chocolate Creeks	1	20	3	Survey Equipment Fly Out

TOTAL FLIGHT TIME

40 minutes

¹Flights listed above are estimates and actual may vary due to unforeseen circumstances such as, but not limited to, weather and mechanical issues. Estimate of flight time is based on light lift helicopters. Flight time will vary depending on the type of helicopter actually available. Equipment transport is dependent on utilizing two load placements/flight.

² Helicopter Types: Type 1 – Heavy Lift; Type3 – Light Lift

Alternative 2) Using Non-Motorized Equipment for Equipment Transport and Motorized Equipment for Drilling

This alternative would require the crew to carry in all components for the project. Equipment could be horse-packed in about 11 miles to Vista Creek. From that point all gear would have to be carried along the unmaintained Upper Suiattle and Dusty Ridge Trails an additional 6 miles of difficult travel with bulky loads. The crew would carry all gear to the Dusty Glacier area. Set up the equipment and depart returning after about one week to pack it up and move it the Chocolate Glacier site. Additional batteries would need to be brought in for the second set up. The crew would then depart and return in a week to pack the equipment back out.

In addition to carrying their own overnight gear for a 3 to 4 day trek each person would also need to carry equipment for the project. At a maximum of 15 extra pounds per person, this would equate to a group of 20 people needed to get the gear in and an additional 5 or so people to pack it all out, due to extra batteries carried in for the second installation. On the final trip to remove the gear, several additional people would be needed to carry out the extra 90 lbs. of batteries that would have been brought in for the second station.

Hazards for the crew involve carrying heavy packs through thick brush, across glacial streams, snowfields, and steep slopes to the antennae sites below Chocolate and Dusty Glaciers.

There is not a non-motorized method to obtain the core samples from rock using traditional tools that can be used for paleomagnetic dating methods. Core samples would be carried out of the wilderness by foot. Each site would generate about 3 pounds of rock cores.

Alternative 3) Using Motorized Equipment for Personnel and Equipment Transport and Drilling

This alternative is similar to Alternative 1, but involves transporting the crew of 4 to the field locations by helicopter as well as the gear. This alternative would more than double the flight time over Alternative 1 increase

Summary Table of Estimated Helicopter Use¹

Location	# of trips	Helicopter Time (min)	Helicopter type ²	Cargo
Dusty Creek	2	40	3	USGS Field Crew Fly In
Dusty Creek	1	20	3	Survey Equipment Fly In
Chocolate Creek	2	40	3	USGS Field Crew Fly Out
Chocolate Creek	1	20	3	Survey Equipment Fly Out

TOTAL FLIGHT TIME

2 hours

Under this alternative, the gasoline powered coring drill would be used and the core samples would be carried out of the wilderness. Each site would generate roughly 3 pounds of rock cores.

WILDERNESS CHARACTER

The Minimum Requirements Analysis requires an evaluation of the impact of the project on Wilderness Character. Wilderness character is the combination of biophysical, experiential, and symbolic qualities that distinguishes wilderness from all other lands (Landres et al., 2008)¹.

The primary mandate of the Wilderness Act of 1964 is to preserve wilderness character as described in section 4(b) of the Act: "Except as otherwise provided in this Act, each agency administering any area designated as wilderness shall be responsible for preserving the wilderness character of the area and shall so administer such area for such other purposes for which it may have been established as also to preserve its wilderness character."

The following sections compare the alternatives of the project within the framework of the five qualities of wilderness character and other factors. No other features of value such as geological or historic sites

¹ Landres, Peter et al. 2008. *Keeping It Wild: An Interagency Strategy to Monitor Trends in Wilderness Character Across the National Wilderness Preservation System*. General Technical Report RMRS-GTR-212. Fort Collins:CO: USDA Forest Service, Rocky Mountain Research Station.

were identified for any alternative so this analysis will only evaluate four elements (untrammelled, undeveloped, natural, and solitude/primitive recreation) of wilderness character. Relevant other factors that are compared are maintenance of traditional skills and economics.

Untrammelled - *An untrammelled area is an area where the earth and its community of life are untrammelled by man and generally appears to have been affected primarily by the forces of nature. Wilderness is essentially unhindered and free from modern human control or manipulation.*

Alternative 1) Using Motorized Equipment for Equipment Transport and Drilling

The project will not result in any manipulation of the natural process within the wilderness.

Alternative 2) Using Non-Motorized Equipment for Equipment Transport and Motorized Equipment for Drilling

Same as Alternative 1.

Alternative 3) Using Motorized Equipment for Personnel and Equipment Transport and Drilling

No change from the current condition.

Undeveloped - *Undeveloped areas are Federal lands without permanent improvement or human habitation and where man himself is a visitor who does not remain. Wilderness retains its primeval character and influence, and is essentially without permanent improvement or modern human occupation.*

Alternative 1) Using Motorized Equipment for Equipment Transport and Drilling

The project would result in a temporary installation that would be a sign of human occupation of the wilderness. The helicopter would not result in any temporary or permanent improvements or evidence of human occupation of the wilderness.

The coring drill would create about 72 3-4" deep holes in the wilderness. If they were found by wilderness visitors they could be viewed as an impact to the primeval character of wilderness. The holes themselves would not impact the untrammelled or natural qualities of wilderness.

Alternative 2) Using Non-Motorized Equipment for Equipment Transport and Motorized Equipment for Drilling

Same as Alternative 1.

Alternative 3) Using Motorized Equipment for Personnel and Equipment Transport and Drilling

Same as Alternative 1.

Natural - Wilderness is managed to preserve natural ecological systems which are substantially free from the effects of modern civilization.

Alternative 1) Using Motorized Equipment for Equipment Transport and Drilling

This alternative would not result in any temporary or permanent improvements or evidence of human occupation of the wilderness.

Alternative 2) Using Non-Motorized Equipment for Equipment Transport and Motorized Equipment for Drilling Same as Alternative 1.

Alternative 3) Using Motorized Equipment for Personnel and Equipment Transport and Drilling

Same as Alternative 1.

Solitude - Wilderness provides outstanding opportunities for solitude or primitive and unconfined recreation.

Alternative 1) Using Motorized Equipment for Equipment Transport and Drilling

It is possible that some visitors may have their experience of solitude degraded by the presence of a helicopter. One is the sight and /or sound of the helicopter delivering sling loads to the antenna sites. Both of these sites are located in a remote part of the wilderness and the most likely scenario will be that any visitors along the Suiattle Trail and a short segment of the PCT may hear the helicopter pass overhead on its way to its destination. Due to the thick forest canopy, they would be unlikely to be able to see the helicopter. Visitors on Miners Ridge, Middle Ridge, or in the Buck Creek Pass area may be able to hear the helicopter, but would have difficulty seeing it from a distance of 5 to 7 air miles against the background of Glacier Peak. Climbers on Glacier Peak rarely utilize routes that involve the Dusty or Chocolate Glaciers due to their remoteness and would not likely be impacted. The four person crew would likely have one camp on or near system trails from which other visitors may come in contact with them while travelling on the PCT.

Drilling of core samples occur in off trail areas. It is unlikely that the coring drill could be heard above ambient background noise. Visitors may come across the three person coring team along trails on their way to visit sites. The coring team would be making about one trip per year. They would be camping in remote areas away from system trails.

Alternative 2) Using Non-Motorized Equipment for Equipment Transport and Motorized Equipment for Drilling

This alternative would not interrupt the experience of solitude of wilderness visitors with a helicopter. Due to the weight of equipment, the amount of time available for surveying would reduce the number of data points obtained. A small pack string would be encountered along the Suiattle Trail and PCT as supplies are delivered to a staging area at Vista Creek camp. There would be no stock access beyond Vista Creek and all supplies would need to be backpacked up from this point. Few if any visitors would see the crew beyond this point. This would most efficiently be done by a crew of 8 people camped at Vista Creek. They would haul gear in roughly 40 pound loads up to the Dusty Creek area and set the equipment up. After a few days, the equipment would then be packed over to the Chocolate Creek area and set up for a few days. The crew would then pack up all gear and return to the Vista Creek Camp. Between the Suiattle Trailhead and Vista Creek Camp, the primitive and unconfined quality of wilderness may be compromised by the presence of numerous crew people using the trail and camps along it.

Equipment would be packed out of the wilderness by a small packstring from Vista Creek.

Alternative 3) Using Motorized Equipment for Personnel and Equipment Transport and Drilling

Alternative 3 would trade off a greater number of trail encounters by field crew members and packstock with an additional 1.3 hours of helicopter flight time in the wilderness. The impacts of the helicopter on solitude would be the same as under Alternative 1, but of greater duration. The possibility of degrading the primitive or unconfined quality of wilderness would be less under this alternative as the crew would be smaller and not occupy otherwise popular trail camps on their way to the project area. Data quality and quantity would be the same as with Alternative 1.

Under this alternative the coring crew would walk to their off-trail project sites and carry the cores out of the wilderness on foot.

Other Feature of Value

The Wilderness Act also identifies other features of value (i.e. “ecological, geological, or other features of scientific, educational, scenic or historical value.”) No other features of value were identified that would be affected by any alternative.

Other Factors

- *Maintaining Traditional Skills –*

None of the electronic equipment to be deployed is traditional in the common sense. Utilizing backpacking, cross country navigation, and wilderness camping skills would be maintained under alternative 1 and 2. Alternative 3 would utilize the helicopter to transport crews to the project sites.

- *Economics and Time Constraints –*

Cost to the taxpayer for this project vary with alternative. Under the most flight extensive alternative total helicopter flight time would be about \$2,000. This would also reduce the crew time in the wilderness so that salary cost would be reduced. An alternative where the crew packed everything in would result in higher project costs as many more person days would be required to schlep gear up and down the mountain. Hiring a packer to haul gear to and from Vista Creek would cost about \$3,000.

- *Safety of Visitors and Workers –*

The project area involves travelling on good trail and also involves cross country travel in some very rugged country. Steep slopes, cliffs, heavy vegetation, steep snow fields, glacial stream fords, and frequent bad weather, requires a very fit and technically skilled team to access the project area. While carrying heavy loads for many person days, the risk of injury due to falls is substantial in this environment.

Safety is a primary concern during work around helicopters. Crews are recommended to only utilize helicopters certified for use by the Forest Service. Helicopter transport in mountainous terrain poses numerous challenges due to vicissitudes in weather conditions, unpredictable winds, and lift conditions in varying temperatures. Disparate temperature conditions and elevations could result in modified load limits.

If helicopters are used, under Alternative 1 and 3 all equipment would be loaded into two slings at the Green Mountain Pasture and would be placed at the project sites in one flight. Under Alternative 3, the helicopter would make an additional trip to the site with the crew. Due to the nature of this project there are no approved landing zones at the project areas. Landing zones must be carefully examined by the pilot prior to setting down. Mountainous areas may require that the landing zone be some distance from the project site for the crew to safely exit the helicopter.

The helicopter will fly from the Darrington Airport to the Green Mountain Pasture staging site.

RECOMMENDATION

After considering the options for this project my recommendation is to implement the Glacier Peak Geology and Sediment Transport Study project as outlined under Alternative 1, utilizing

helicopter transport for the field survey equipment and the use of a gasoline powered coring drill to extract rock cores for dating. All field crews will access the project sites on foot. Packstock may be used, where feasible, to assist access to the area. A gas powered coring drill is needed to conduct the accurate dating studies to further the understanding of the volcano. An alternate dating method is not available. I feel that this method will maximize the quality of data collected while minimally impacting the experience of wilderness visitors.

I find that this alternative does not alter the Untrammeled or Natural character of wilderness. While it is unlikely that the small coring holes would be discovered, these would be a minor indication of human presence and occupation of the wilderness. Solitude character would not likely be impacted by the use of the coring drill, however the two helicopter flights to and from the project site may impact visitors along the trail. This impact would be a minor intrusion compared with the frequent low elevation F-18 jets in the military training.

The experience of a Primitive and Unconfined Recreation will not be affected by this project as crews will camp in areas not frequented by recreationists intent on more popular hiking and climbing routes in the area.

Conducting these studies will assist the Forest Service in proper administration of the Glacier Peak Wilderness. The presence of glaciers and volcanoes in this remote setting is unique among the large Cascade volcanoes. Receding glaciers, unstable moraines and volcanic material have contributed to major flooding events in recent years. Major storms affecting the Glacier Peak area have damaged or destroyed infrastructure including trails, bridges and campsites in the wilderness. Understanding the dynamics of this environment will help the Forest Service administer the Glacier Peak Wilderness including how and where to locate trails and camps.

I recommend the following mitigation requirements:

1. Flights should take place on weekdays when fewer people are visiting these areas.
2. Camp on east side of Vista Creek to avoid taking up other camps.
3. All drill holes will be back-filled with coring dust and other fine material.
4. Details, including timing, of the project will be posted on the Mt. Baker-Snoqualmie website.

Approved: _____

JAMIE KINGSBURY
Forest Supervisor

Date: _____

6/30/2016

